Report on

Arsenic, Chromium, Chromium+6 and Lead in Small Well Water System

2011 Follow Up Study

Prepared by

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Department of Agricultural Commissioner/Weights and Measures
County of Los Angeles

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On July 13, 2010, the County of Los Angeles Board of Supervisors instructed the Environmental Toxicology Laboratory of the Department of Agricultural Commissioner/ Weights and Measures to conduct an expanded study of small well water facilities for presence of Arsenic, Total Chromium, Hexavalent Chromium (Chromium+6), and Lead in the water supplies and report back to the Board in 180 days. This action was to provide a follow up study to the report on Chromium, Arsenic and Lead in Small Well Water 2001 Pilot Study published February 14, 2001.

Chromium may exist in water in two forms: as Trivalent Chromium (Cr+3) and/or as Hexavalent Chromium (Cr+6). There is general agreement in the scientific community that Chromium+6 is the form that poses the greatest risk to animal and human health.

Inorganic arsenic may exist in water supplies as arsenic 3 (trivalent arsenic) and/or as arsenic 5 (pentavalent arsenic). Arsenic 3 is metabolized into methyl arsenic 3 or dimethyl arsenic 3. Arsenic 3 is more toxic than arsenic 5, and methyl arsenic 3 is more toxic than arsenic 3.

Lead may exist in water supplies in divalent or tetravalent form, but no information is available regarding which form may be deemed more toxic.

Total Chromium MCL (established):
Title 22, California Code of Regulations, Section 64431, defines the maximum contaminant level (MCL) for Total Chromium at **50 parts per billion (ppb)**. This is a more restrictive standard than the US EPA's MCL of 100 ppb.

Chromium +6 MCL (not established):
Neither the US EPA nor the State has an established separate standard for Hexavalent Chromium (Chromium+6). Due to expressed public concerns regarding Chromium+6 in drinking water, the State's Office of Environmental Health Hazard Assessment (OEHHA) established a Public Health Goal (PHG) of 0.02 ppb for Chromium+6 on July 27, 2011. Effective January 3, 2001, the State Department of Public Health (DPH), Division of Drinking Water and Environmental Management adopted a regulation to add Chromium+6 to the list of unregulated chemicals requiring monitoring [6]. However, **no MCL for Chromium +6 has been established**.

Arsenic MCL (established):
The maximum contaminant level (MCL) for arsenic established by the **State is 10 ppb** and the **Federal MCL is also set at 10 ppb.**

Lead Action Level:
The Federal and State action levels for lead are established at **15 ppb**

Sample Collection and Analysis

A total of **one hundred ninety five (195) well water samples** from across Los Angeles County were collected from March 2, 2011, to September 11, 2011. Los Angeles County Public Health had provided a list of all active wells in its database to the Environmental Toxicology Laboratory. The Lab utilized this list as reference and sought assistance from Public Health to collect samples from each well. Methods approved by the State and the US EPA were used to test for the presence and levels of Arsenic, Total Chromium, Chromium+6, and Lead. All Chromium+6 samples were analyzed within 24 hours of collection as mandated by the approved method.

Total Chromium:
One hundred thirty five (135) wells were found to have a detectable presence of Total Chromium in the well water at levels equal to or higher than the applicable Detection Limit of 2.5 ppb (the lowest reportable level). The detectable presence of Total Chromium represented 69.2% of all wells tested.
No wells were found to contain more than 50 ppb Total Chromium (the current MCL for Total Chromium).

Chromium +6:
Eighty one (81) wells were found to have presence of Chromium+6 in the well water at a level equal to or greater than the applicable Detection Limit of 0.25 ppb (the lowest reportable level). The detectable presence of Chromium+6 represented 41.5% of all wells tested. The highest concentration of Chromium+6 found was 12.3 ppb and the average concentration found was 1.23 ppb.
There is no established MCL for chromium+6.

Arsenic:
Ninety five (95) wells were found to have detectable Arsenic levels equal to or higher than the applicable Detection Limit of 1.0 ppb (the lowest reportable level). The detectable presence of Arsenic in the well water represented 48.7% of all wells tested.
Twelve (12) wells were found to have presence of Arsenic at levels greater than the MCL of 10 ppb

Lead:
Seventy seven (77) wells were found to have presence of Lead in the well water equal to or higher than the applicable Detection Limit of 1.0 ppb (the lowest reportable level). The detectable presence of Lead in well water represented 39.5% of all wells tested.
One (1) well was found to contain Lead that was higher than the State and Federal action level of 15 ppb.

Board Directive

On July 13, 2010, on a motion by Fifth District Supervisor Michael Antonovich and unanimously passed by the County of Los Angeles Board of Supervisors, the Board instructed the Environmental Toxicology Bureau of the Department of Agricultural Commissioner/Weights and Measures (ACWM) to conduct an expanded study of all small well water facilities under jurisdiction of the Los Angles County Department of Public Health for presence of Total Chromium, Lead and Arsenic and to report back to the Board within 180 days.

Background

TOTAL CHROMIUM AND CHROMIUM+6

Chromium salts are widely use in industrial applications. Examples include use in cooling towers for corrosion control, as solutions in electroplating plants, and as catalysts in petroleum refining operations. Discharges of waste from these industries may have caused chromium to enter ground water supplies. Chromium may exist in water supplies in two forms: as trivalent chromium (Cr+3) and/or as hexavalent chromium (Cr+6) [2]. There is general agreement in the scientific community that Cr+6 is the form that poses the highest risk to animal and human health [1], [3], [4], [5]. It can cause allergic dermatitis and be carcinogenic to humans.

I. Current Regulation

Title 22, California Code of Regulations, Section 64431, defines the standards for certain contaminants in the State's drinking water supply. One such contaminant is Total Chromium. The standard set for Total Chromium corresponds to the combined concentrations of Cr+3 and Cr+6. The **State's drinking water standard for Total Chromium is 50 ppb** [6]. This is more restrictive than the US EPA's standard of 100 ppb [6]. Neither the US EPA nor the State has set a separate standard for Cr+6 [6]. Therefore, the **standard for Cr+6 is 50 ppb in California** and 100 ppb for other states. Because Total Chromium is regulated, the State requires municipal water suppliers to test drinking water sources for Total Chromium regularly.

Current MCL for Total Chromium

Total Chromium is currently regulated under the 50 ppb maximum contaminant level (MCL). California's MCL for Total Chromium was established in 1977, when the State adopted what was then a "National Interim Drinking Water Standard" for chromium. The Total Chromium MCL was established to address exposures to Chromium+6, which is considered to be the more toxic form of chromium.

The US Environmental Protection Agency (US EPA) adopted the same standard, but in 1991, raised the federal MCL to 100 ppb. California did not follow US EPA's lead and retained its 50 ppb MCL for Total Chromium.

Specific MCL for Chromium+6 (not established)

California's Health and Safety Code guides development of an MCL for Chromium+6. Health and Safety Code §116365.5 required the adoption of an MCL for Chromium+6 by January 1, 2004, but **no MCL has yet been established**. In addition, Health and Safety Code §116365(a) requires CDPH to establish an MCL at a level as close as is technically and economically feasible to the contaminant's Public Health Goal. Public Health Goals (PHGs) are contaminant concentrations in drinking water that do not pose a significant risk to health. PHGs are developed by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA).

II. Public Health Goal (PHG)

Public Health Goals are established levels of contaminants in drinking water that pose an insignificant risk to public health. They are based on human health risk assessments and are established by the State's OEHHA. PHGs serve two purposes: for State DPH to identify contaminants for which standards or maximum allowable contaminant levels (MCL) in drinking water need to be reviewed for possible revision and for municipal water suppliers to provide information to consumers about drinking water contaminants [7].

In March 1999, in compliance with Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, the OEHHA classified Chromium+6 as a carcinogen.

On July 17, 2011, OEHHA announced that the PHG for Hexavalent Chromium, also known as Chromium+6, is established at 0.02 parts per billion (ppb). **The public health goal for Chromium+6 is not a maximum "safe" level for exposure to the chemical.** Rather, it serves as an assessment of the health risk posed by drinking water that contains Chromium+6, based on an estimated "one-in-one-million" lifetime cancer risk level. For every million people who drink tap water containing that level of chromium 6 each day for 70 years, there is likely to be one additional case of cancer from exposure to the chemical.

ARSENIC

Higher levels of Arsenic tend to be found in ground water than in surface water sources of drinking water. Arsenic occurs naturally in rocks, soil, water, air, plants and animals. EPA set the maximum contaminant level (MCL) for Arsenic at 50 ppb in 1975. In March 1999, the National Academy of Science reported that the then established standard of 50 ppb did not achieve EPA's goal of protecting public health and should be lowered. **Currently, the maximum contaminant level (MCL) regarding Arsenic is 10 ppb**. Potential health effects from long term Arsenic exposure are skin damage, problems with circulatory systems, and increased risk of cancer.

I. Current Regulation

On June 22, 2000, EPA proposed a new drinking water standard of 5 ppb for Arsenic and requested comments on other possible standards of 3 ppb, 10 ppb and 20 ppb. Under the Safe Drinking Water Act amendments of 1996, EPA was required to issue a final rule by January 1, 2001, but Congress subsequently extended this date to June 22, 2001. On January 22, 2001, the US EPA revised the maximum contaminant level (MCL) for Arsenic from 50 ppb to 10 ppb [8].

California's revised Arsenic MCL of 10 ppb (equivalent to 10 micrograms per liter, µg/L) became **effective on November 28, 2008,** although the federal MCL for Arsenic has been in effect since January 2006 [9].

LEAD

Most Lead contamination of drinking water likely comes from metal pipes that deliver the water from the water sources. Potential effects from Lead exposure are mostly applicable to infants and children. Symptoms include delays in physical and mental development and slight deficit in attention span and learning abilities. In adults, Lead exposure can produce kidney and blood pressure effects.

I. Current Regulation

No MCL has been established for Lead in drinking water in the State of California. However, there has been established an **Action Level of 15 ppb** in accordance with National Primary Drinking Water Regulations for Lead, which established an action level of 15 ppb for Lead in drinking water in 1991.

Well Water Sampling

A total of one hundred ninety five (195) wells under the jurisdiction of the County Department of Public Health were sampled for water analysis under this study. ACWM appreciates the work of the Public Health Inspectors who collected all the well water samples for this study. Addresses of the wells and the individual testing results are attached with this report (**Attachment A**).

Sampling Protocols

Samples from wells were collected from March 2, 2011, through September 11, 2011. Collection bottles were 500 milliliter plastic containers. Bottles used for Chromium+6 samples contained no preservatives and bottles for Arsenic, Total Chromium, and Lead samples contained a nitric acid preservative. All samples were kept in cool storage immediately after collection until they were tested. Analyses for Chromium+6 were performed within 24 hours of collection.

Testing Procedures

TOTAL CHROMIUM, ARSENIC AND LEAD

The method used for Total Chromium analysis is US EPA Method 200.8 - Determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma-Mass Spectrometry. In order to eliminate any interference of polyatomic isobaric molecular ion of argon carbon species to Total Chromium, laboratory personnel added 1% hydrogen peroxide to each acidified sample and warmed the sample on a hot plate to 80 degrees centigrade for one hour. Each sample was covered by a watch glass during warming to avoid volume changes. Interference may come from the presence of carbonate and bicarbonate that may exist in the sample. [2]

CHROMIUM+6

The method used for Chromium+6 analysis is US EPA 218.6 - Method-Determination of Dissolved Hexavalent Chromium in Drinking Water, Groundwater, and Industrial Wastewater Effluent by Ion Chromatography. [2]

Results

REPORTING PROTOCOL

The Environmental Toxicology Laboratory is responsible for producing test results in accordance with State or EPA approved methods. The Laboratory established an automatic alert system, along with immediate direct notification to Los Angeles County Department of Public Health, when any test result was found to be above applicable regulatory limits. The Department of Public Health, Environmental Health, Drinking Water Division was the direct contact and had sole discretion and decision-making authority regarding how to proceed in each case.

TOTAL CHROMIUM AND CHROMIUM+6

I. Detection Limit

The Laboratory used a sensitive inductively coupled plasma-mass spectrometer to analyze for presence and levels of **Total Chromium** in water samples to a threshold (Detection Limit) of **2.5 ppb**. The threshold (Detection Limit) for ion chromatographic determination of **Hexavalent Chromium (Chromium+6)** was **0.25 ppb**.
- Concentrations below these Detection/Reporting Limits were considered not detected.
- Results are reported in parts per billion (ppb).

II. County-Wide Results

All one hundred ninety five (195) samples collected from the wells were tested for the presence and levels of Total Chromium and Chromium+6. Table 1 summarizes the overall figures for this study. Attachment A contains tabulated results for all wells tested.

Table 1. County-Wide Results

Contaminant	Detection Limit (ppb)	Wells Above Detection Limit	% Positive Presence	Wells Exceeding MCL	% Wells Exceeding MCL
Total Chromium	2.50	135	69.2%	-0-	0%
Chromium+6	0.25	81	41.5%	N/A – No MCL	N/A – No MCL

One hundred thirty five (135) wells (69.2%) were found to have water supplies with Total Chromium concentrations higher than the Detection Limit of 2.50 ppb. Eighty one (81) wells (41.5%) were found to have water supplies with Chromium+6 higher than the Detection Limit of 0.25 ppb. The highest concentrations found for Total Chromium and Chromium+6 were 16.6 ppb and 12.3 ppb, respectively. Tables 2 and 3 list the respective ten wells with highest concentrations of Total Chromium and Chromium+6.

Table 2. Ten Wells with Highest Concentrations of Total Chromium

City	Address	Total Chromium (ppb)
PALMDALE	20TH Street West / Avenue O - 2	16.60
LANCASTER	46124 125th Street East (12501 E. Ave H)	13.40
LANCASTER	1304 E Avenue I	11.60
LANCASTER	44717 18th Street West	11.50
LANCASTER	2059 E. Avenue I	11.20
LANCASTER	1617 E. Avenue I	11.00
LANCASTER	507 E. Avenue L-8	10.80
LANCASTER	3157 E. Avenue I	10.70
LANCASTER	2550 E. Avenue I	10.20
ACTON	3877 Smith Ave.	10.10

NOTE:

- No well was found to have Total Chromium concentrations exceeding the Maximum Contaminant Level (MCL) of 50 ppb.

Table 3. Ten Wells with Highest Concentrations of Chromium+6

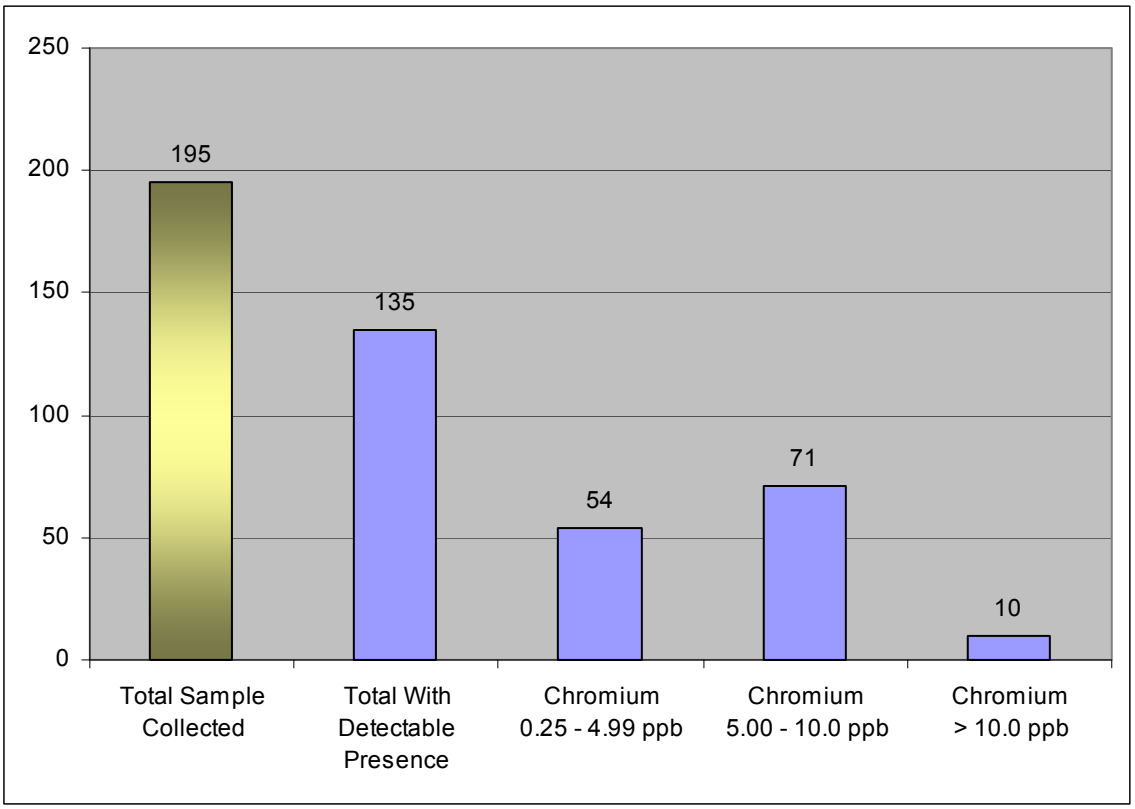
City	Address	Chromium+6 (ppb)
LANCASTER	46124 125th Street East (12501 E. Ave H)	12.30
LANCASTER	1304 E. Avenue I	11.40
LANCASTER	1617 E. Avenue I	11.00
LANCASTER	44717 18th Street West	10.90
LANCASTER	507 E. Avenue L-8	10.00
LANCASTER	1725 W. Avenue K-8	9.71
LANCASTER	3157 E. Avenue I	9.50
LANCASTER	2550 E. Avenue I	9.40
LANCASTER	2059 E. Avenue I	9.30
LANCASTER	2515 E. Avenue I	9.10

NOTE:

- No Maximum Contaminant Level has been established for Chromium +6.

Figure 1 below displays the numbers of wells found with detectable presence of Total Chromium. Wells are grouped by concentration ranges of Total Chromium detected.
- One hundred thirty five (135) wells tested positive for presence of Total Chromium.
- Fifty four (54) wells had concentrations between 0.25 ppb to 4.99 ppb.
- Seventy one (71) wells had concentrations between 5.0 ppb to 10 ppb.
- Ten (10) wells had concentrations higher than 10 ppb.

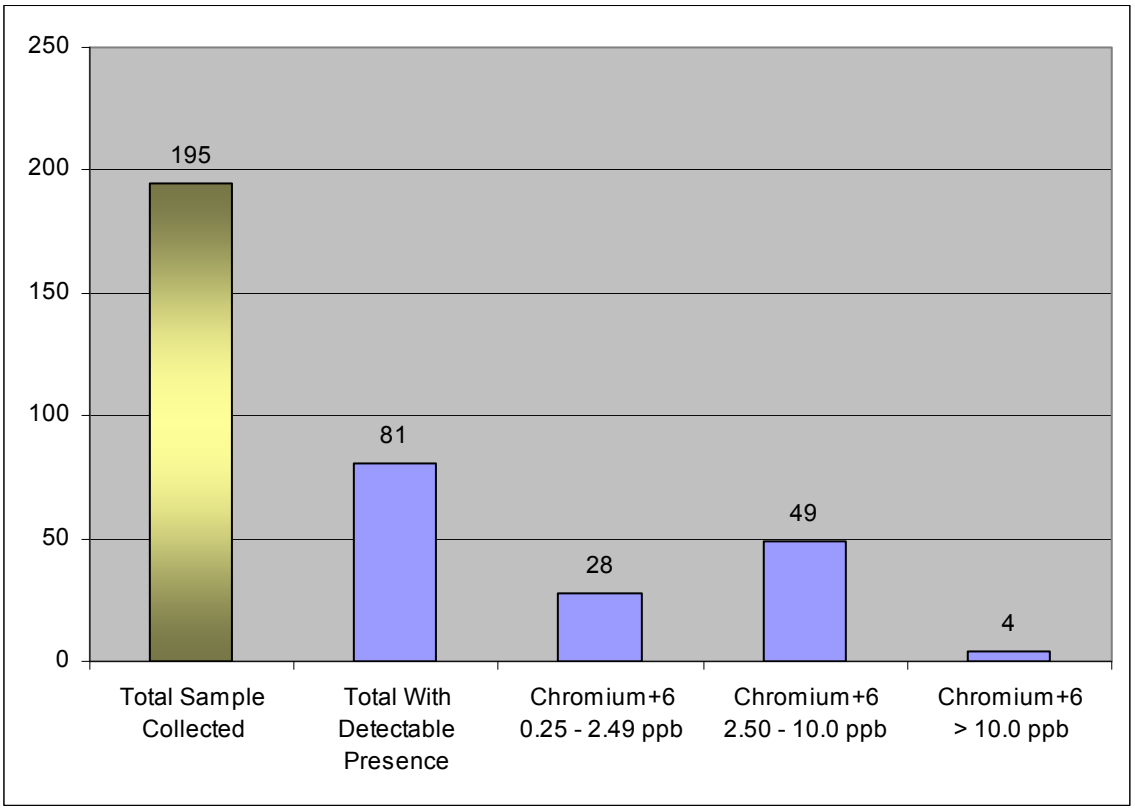
Figure 1. Distribution of Total Chromium in Well Water County-Wide



NOTE:
- No well was found to have Total Chromium concentrations exceeding the Maximum Contaminant Level (MCL) of 50 ppb.

Figure 2 below displays the numbers of wells found with detectable presence of Chromium+6. Wells are grouped by concentration ranges of Chromium+6 detected.
- Eighty one (81) wells tested positive for presence of Chromium+6.
- Twenty eight (28) wells had concentrations between 0.25 ppb to 2.49 ppb.
- Forty nine (49) wells had concentrations between 2.50 ppb to 10 ppb.
- Four (4) wells had concentrations higher than 10 ppb.

Figure 2. Distribution of Chromium+6 in Well Water County-Wide



NOTE:
- No Maximum Contaminant Level has been established for Chromium +6.

ARSENIC

I. Detection Limit

The detection limit for Arsenic by ICP/MS using EPA Method 200.8 was **1.0 ppb** (ug/l).

II. County-wide Results

Table 4 summarizes the overall results of Arsenic analyses for this study.
Ninety five (95) of one hundred ninety five (195) wells tested were found to have detectable presence of Arsenic.
Twelve wells were found to have arsenic concentrations higher than the Maximum Contaminant Level (MCL) of 10 ppb.
(See Attachment A for arsenic levels of individual facilities.)

Table 4. County-Wide Results Re: Arsenic

Contaminant	Detection Limit (ppb)	Wells Above Detection Limit	% Positive Presence	Wells Exceeding MCL Of 10 ppb	% Wells Exceeding MCL Of 10 ppb
Arsenic	1.00	95	48.7%	12	6.15%

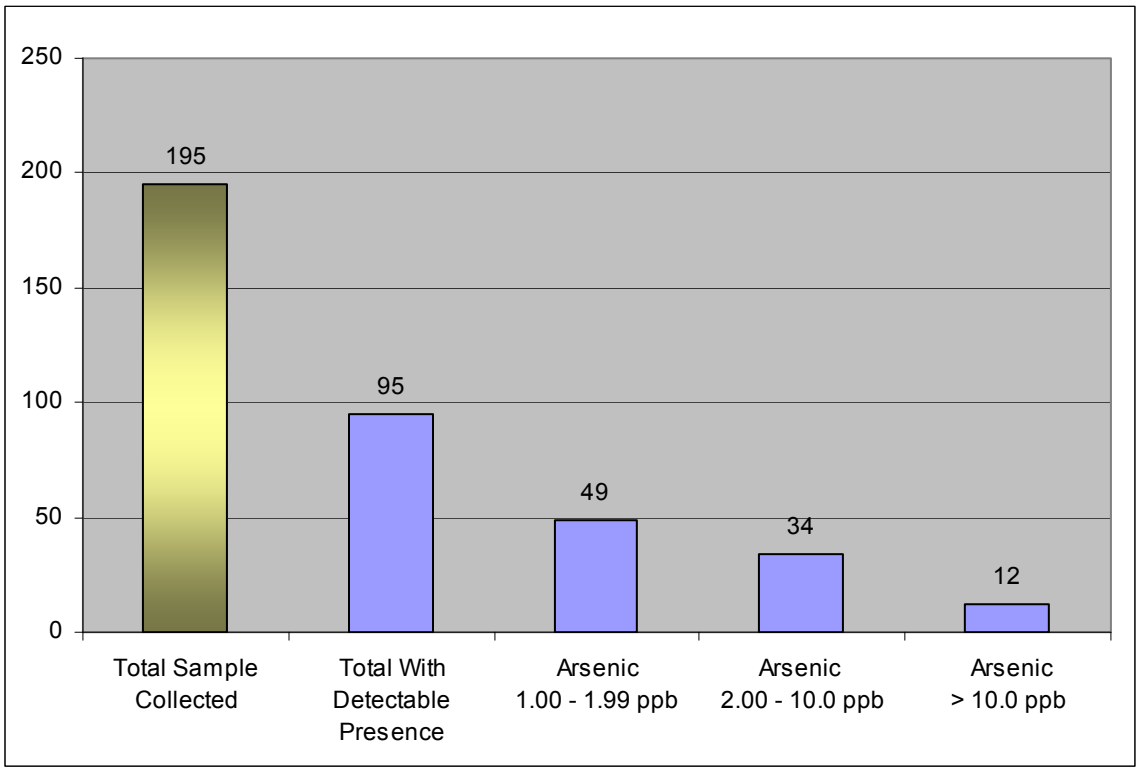
Table 5. Ten wells with Highest Concentrations of Arsenic

City	Address	Arsenic (ppb)
SAUGUS	30061 San Francisquito Cyn Rd. (Well#2)	72.00
SAUGUS	30769 San Francisquito Cyn Rd.	64.50
LANCASTER	231 W. Avenue G	42.40
TUJUNGA	3150 Big Tujunga Rd.	22.80
LANCASTER	721 W. Avenue E	21.20
SAUGUS	30061 San Francisquito Cyn Rd.;(Well#1)	19.10
GLENDORA	2600 Dalton Cyn. Rd.	18.20
LANCASTER	47455 N. Division St.	18.20
LANCASTER	28115 W. Avenue C-6	13.60
SAUGUS	28877 Bouquet Cyn Rd.	13.30

Table 5 lists the ten wells with the highest presence of Arsenic.
Two wells in Saugus had the highest concentrations of Arsenic, at 72 ppb and 64.5 ppb.

Figure 3 below displays the numbers of wells found with detectable presence of Arsenic. Wells are grouped by concentration ranges of Arsenic detected.
- Ninety five (95) wells tested positive for presence of arsenic.
- Forty nine (49) wells had concentrations between 1.00 ppb to 1.99 ppb.
- Thirty four (34) wells had concentrations between 2.00 ppb to 10 ppb.
- Twelve (12) wells had concentrations higher than 10 ppb (the MCL).

Figure 3. Distribution of Arsenic in Well Water County-Wide



LEAD

I. Detection Limit

The detection limit for Lead by ICP-MS using EPA Method 200.8 was **1.0 ppb** (ug/l).

II. County-Wide Results

Table 6 summarizes the overall results of analyses for Lead for this study.
Seventy seven (77) out of one hundred ninety five (195) wells tested were found to have detectable presence of Lead.
One (1) well was found to have a Lead concentration higher than the State and Federal action level of 15 ppb, with a concentration level of 37 ppb.
Lead contamination was likely due to pipe corrosion.
(See Attachment A for Lead analysis results of individual facilities.)

Table 6. County-Wide Results

Contaminant	Detection Limit (ppb)	Wells Exceeding Detection Limit (1.0 ppb)	% Positive Presence	Wells Exceeding Action Level	%Wells Exceeding Action Level
Lead	1.00	77	39.5%	1	0.5%

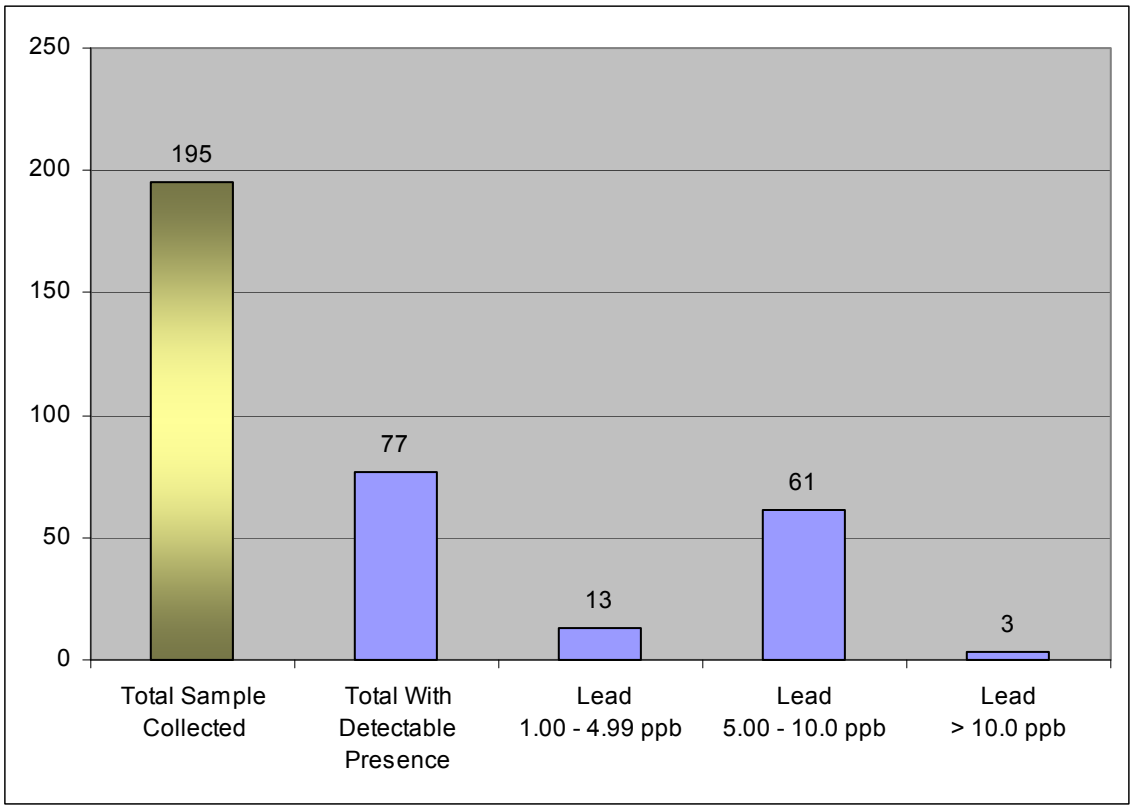
Table 7. Ten Wells with Highest Concentrations of Lead

City	Address	Lead (ppb)
CASTAIC	38001 Golden West Hwy.	37.00
AGUA DULCE	13800 Sierra Hwy.	14.60
LA VERNE	3331 San Dimas Canyon Road	13.80
TUJUNGA	803 Big Tujunga Canyon Road	9.86
ACTON	30500 Arrastre Canyon Road (Well#1)	9.48
WRIGHTWOOD	50 Fts. South East Of Jackson Lake	7.75
LA CANADA	Star Route - Mile Marker 53	7.07
SAUGUS	30800 Bouquet Cyn Rd.	6.51
MALIBU	3133 S Decker Cyn Rd.	6.30
CANYON COUNTRY	17100 Sierra Hwy.	6.25

Table 7 list the ten wells with the highest presence of lead.
One (1) well located in Castaic was found with water supplies exceeding the State and Federal action level of 15 ppb.

Figure 4 below displays the numbers of wells found with detectable presence of Lead. Wells are grouped by concentration ranges of Lead detected.
- Seventy seven (77) wells tested positive for presence of lead.
- Thirteen (13) wells had concentrations between 1.00 ppb to 4.99 ppb.
- Sixty one (61) wells had concentrations between 5.00 ppb to 10 ppb.
- Three (3) wells had concentrations higher than 10 ppb.

Figure 4. Distribution of Lead in Well Water County-Wide



NOTE:
- One (1) well located in Castaic was found with water supplies exceeding the State and Federal action level of 15 ppb.

Summary

One hundred ninety five (195) wells from locations throughout Los Angeles County were sampled for this study. Please refer to Attachment A for the test results of each individual well within each city/community.
Generally, wells located in northern sections of Los Angeles County were found to have water with the highest results for Total Chromium, Chromium+6, Arsenic and Lead.

Table 8. Summary of Wells with Detectable Levels of Total Chromium, Chromium+6, Arsenic and Lead; Notable Results

	Total Positive	% Positive	Wells Exceeding Maximum Contaminant Level ('Action Level' re: Lead)
Total Chromium (>2.50 ppb*)	135**	69.2%	- 0 -
Chromium+6 (>0.25 ppb*)	81**	41.5%	No MCL Established
Arsenic (>1.00 ppb*)	95**	48.7%	12***
Lead (>1.00 ppb*)	77**	39.5%	1****

* Laboratory Detection Limit for reporting.
** Total number with detectable presence
*** State Arsenic MCL = 10 ppb.
**** State Lead Action Level = 15 ppb.

Table 8 above summarizes the overall results of water sample analyses.
- One hundred thirty five (135) wells (69.2%) w/detectable presence of Total Chromium
- Eighty one (81) wells (41.5%) had detectable presence of Chromium+6.
- Ninety five (95) wells (48.7%) had detectable presence of Arsenic.
- Seventy seven (77) wells (39.5%) had detectable presence of Lead.

- Zero (-0-) wells (-0-%) exceeded the Maximum Contaminant Level for Total Chromium
- No MCL has been established for Chromium+6, hence none exceed any standard.
- Twelve (12) wells (6.15%) exceeded the Maximum Contaminant Level for Arsenic.
- One (1) well (0.5%) exceeded the State/Federal Action Level for Lead.

Discussion

This Follow-Up Study has been conducted ten (10) years after a similar study was completed and reported February 14, 2001. This report is not a complete evaluation of the presence and levels of Arsenic, Total Chromium, Chromium+6, and Lead in the entire Los Angeles County well water system. It is presented to provide a brief overview of the levels of these trace metals in the small well systems under the direct jurisdiction of Los Angeles County Department of Public Health. These findings may serve to alert public officials and other concerned agencies about levels of Arsenic, Total Chromium, Chromium+6, and Lead in the public drinking water wells. One hundred ninety five (195) wells were tested, representing a relatively small portion of all well water facilities in Los Angeles County.

TOTAL CHROMIUM AND CHROMIUM+6

The study found that Total Chromium was detectable (above Detection Limit of 2.5 ppb) in 135 (69.2%) of the County's 195 wells, with a highest concentration of 16.6 ppb. Chromium+6 was detectable (above the detection limit of 0.25 ppb) in 81 wells (41.5%), with a highest concentration of 12.3 ppb.

The study found that, in all samples, the Total Chromium levels identified were well below the current State standard of 50 ppb. However, 69.2% of the wells tested above the State Public Health Goal (PHG) of 2.5 ppb for Total Chromium and 41.5% exceeded 0.25 ppb for Chromium+6 (the lowest reportable level) and, hence, the recently established PHG for Chromium+6 of 0.02 ppg. As discussed early in this report, the California Department of Public Health, Office of Environmental Health Hazard Assessment (OEHHA) had been examining the establishment of an MCL or Public Health Goal (PHG) for Chromium+6 for many years. On July 17, 2011, OEHHA officially adopted a PHG for Chromium+6 of 0.02 ppb, but has not yet established a Maximum Contaminant Level for Chromium+6 as a standard.

Results of this study confirm State DPH data that there exist Total Chromium and Chromium+6 contaminants in well water supplies. The study also demonstrates that the ratio of Chromium+6 to Total Chromium is not constant at 7.2% but, rather, may fluctuate anywhere from <10% to 100%. These results may raise questions regarding the State PHG of 2.5 ppb for Total Chromium set by the OEHHA, as the State PHG was based on the assumption that, at 2.5 ppb of Total Chromium, the public's exposure to Chromium+6 would be less than 0.2 ppb. The results of the County's study indicate that water containing 2.5 ppb Total Chromium could potentially provide for exposure of water consumers to Chromium+6 levels as high as 2.5 ppb. It is noteworthy that such is more than one hundred times higher than the 0.02 ppb that OEHHA has adopted as a Public Health Goal (PHG).

ARSENIC

The Environmental Toxicology Laboratory's Detection Limit (lowest reportable level) for Arsenic is 1.0 ppb. Forty nine percent (49%) of all wells were found to have water supplies with a detectable presence of Arsenic (above the Detection Limit of 1 ppb). The highest concentration of Arsenic found was 72 ppb. The established State and Federal Maximum Contaminant Level (MCL) for Arsenic in drinking water is 10 ppb.

Twelve (12) wells (6.15%) were found to have water with **Arsenic at levels above the US EPA standard of 10 ppb**. Most are located in northern Los Angeles County areas.

LEAD

The Environmental Toxicology Laboratory's Detection Limit (lowest reportable level) for Lead is 1.0 ppb. Thirty nine percent (39%) of wells were found to have water supplies with a detectable presence of Lead (above the Detection Limit of 1 ppb).

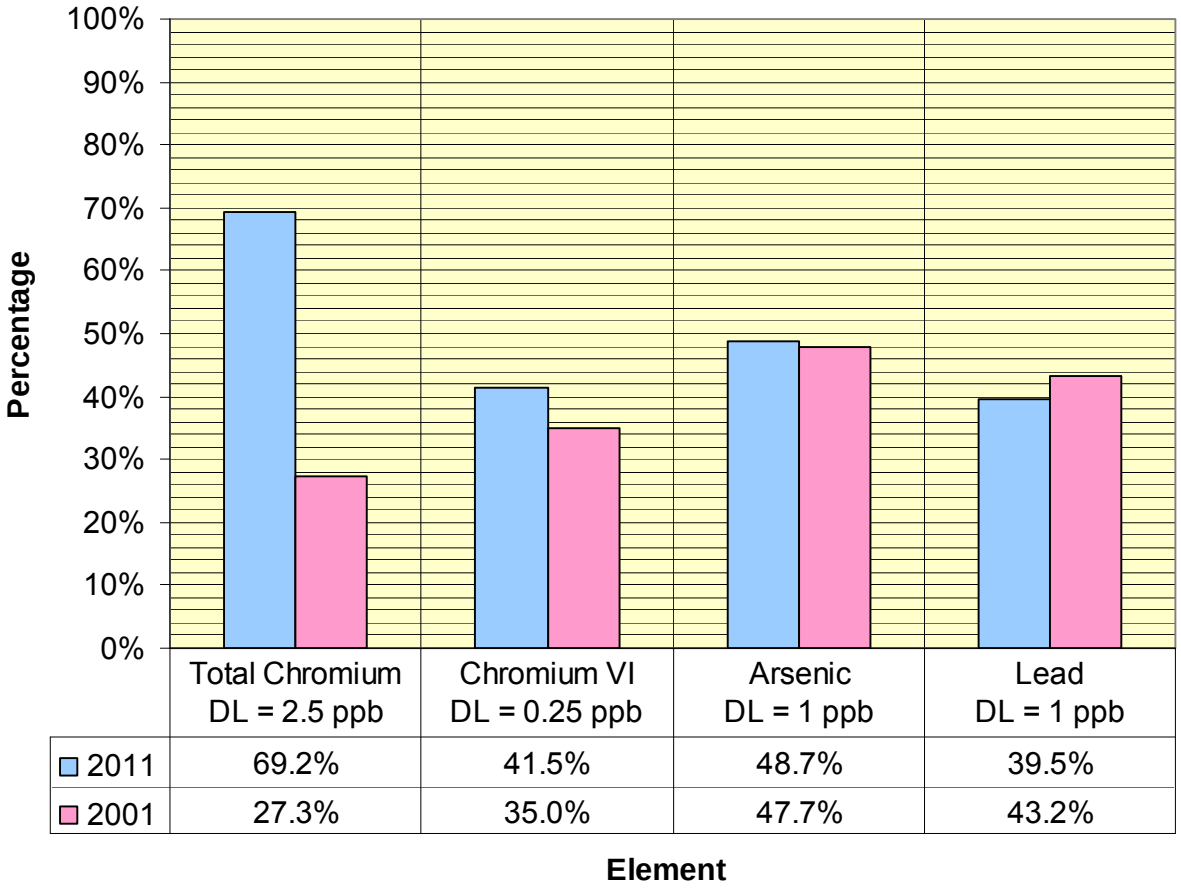
One (1) well (0.5%) of 195 tested was found to have water with a **Lead concentration higher than the State and Federal Action Level of 15 ppb, with a level of 37 ppb**.

Over All Comparison Between 2011 vs 2001 Studies

Element	# of Wells above Reporting Limit in 2011	# of Wells above Reporting Limit in 2001	% change
Total Chromium	135 (69.2%)	60 (27.3%)	↑41.9%
Chromium+6	81 (41.5%)	77 (35%)	↑6.3%
Arsenic	95 (48.7%)	105 (47.7%)	↑1.0%
Lead	77 (39.5%)	95 (43.2%)	↓3.7%

Comparisons of 2011 and 2001 results indicate that there is a trend of increasing contaminant levels in the well water system in Los Angeles County region. Lead presence shows single-digit percentage reductions while Arsenic and Chromium+6 presences show single-digit percentage increases. The most obvious trend revealed by the study regards increases in the detectable presence of Total Chromium in well water, amounting to more than double that of the ten-year-past study period. It is noted that none of the 195 wells tested demonstrated results above the MCL for Total Chromium.

Percent Comparison of Tested County Wells with Detectable Presence of Elements (2011 vs 2001)



	Total Chromium DL = 2.5 ppb	Chromium VI DL = 0.25 ppb	Arsenic DL = 1 ppb	Lead DL = 1 ppb
2011	69.2%	41.5%	48.7%	39.5%
2001	27.3%	35.0%	47.7%	43.2%

Comparison Trend of County Well Water Studies of 2011 vs 2001		
	2011	**2001**
Total Sample Collected:	195	220
Above Detection Limit		
Total Chromium > 2.5 ppb	135 (69.2%)	60 (27.3%)
Chromium+6 > 0.25 ppb	81 (41.5%)	77 (35%)
Arsenic > 1.00 ppb	95 (48.7%)	105 (47.7%)
Lead > 1.00 ppb	77 (39.5%)	95 (43.2%)
List of Samples/Locations above Regulatory Limit		
Total Chromium	**None Above MCL of 50 ppb**	**None Above MCL of 50 ppb**
Chromium+6	**No MCL Established**	**No MCL Established**
Arsenic	**12 Above MCL of 10 ppb**	**13 Above MCL of 10 ppb**
	72.0 ppb (Saugus)	44.5 ppb (Lancaster)
	64.5 ppb (Saugus)	34.4 ppb (Lancaster)
	42.4 ppb (Lancaster)	21.3 ppb (Santa Clarita)
	22.8 ppb (Tujunga)	18.9 ppb (Tujunga)
	21.2 ppb (Lancaster)	18.5 ppb (Altadena)
	19.1 ppb (Saugus)	17.9 ppb (Saugus)
	18.2 ppb (Glendora)	17.8 ppb (Lancaster)
	18.2 ppb (Lancaster)	16.2 ppb (Artesia)
	13.6 ppb (Lancaster)	15.1 ppb (Cerritos)
	13.3 ppb (Saugus)	13.3 ppb (Neenach)
	11.7 ppb (Lancaster)	11.2 ppb (Lancaster)
	10.1 ppb (Saugus)	10.9 ppb (Acton)
		10.7 ppb (Lancaster)
Lead	**1 Above Action Level of 15 ppb**	**5 Above Action Level of 15 ppb**
	37.0 ppb (Castaic)	115.0 ppb (Castaic)
		56.2 ppb (Lancaster)
		54.2 ppb (Big Pines)
		27.9 ppb (Lancaster)
		18.4 ppb (Angeles National Forest)

MCL = Maximum Contaminant Level
"Action Level" equivalent to "MCL"

Results represent water samples submitted to the laboratory containing elements that exceeded State Drinking Water regulations. Upon testing and result determination, Los Angeles County Department of Public Health was immediately notified for further action.

References

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[6] http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Chromium6.aspx

[7] http://www.cdph.ca.gov/programs/Pages/DDWEM.aspx/chemicals/PHGs/phgindex.htm

[8] http://water.epa.gov/drink/index.cfm

[9] http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Arsenic.aspx

2011

ATTACHMENT A (195 Small Well Water System Tested)

Address	City	Arsenic	Total Chromium	Lead	Chromium+6
Detection Limit for Reporting		1 ppb	2.5 ppb	1 ppb	0.25 ppb
30500 ARRASTRE CANYON RD. (Well #1)	ACTON	5.33	6.93	9.48	ND
30500 ARRASTRE CANYON RD. (Well #2)	ACTON	1.80	2.82	2.32	ND
3877 SMITH AVE.	ACTON	11.70	10.10	1.23	8.07
4700 CROWN VALLEY RD.	ACTON	1.19	ND	ND	0.41
7601 SOLEDAD CANYON	ACTON	ND	2.57	ND	ND
8237 SOLEDAD CANYON RD.	ACTON	1.57	3.70	ND	ND
8800 SOLEDAD CANYON RD.	ACTON	ND	3.81	ND	ND
33201 AQUA DULCE CANYON RD.	AGUA DULCE	ND	5.89	1.04	2.40
10124 SIERRA HWY.	AGUA DULCE	ND	3.92	1.08	0.94
10700 W. ESCONDIDO CANYON RD.	AGUA DULCE	1.52	4.56	1.44	1.70
11311 FRASCATI RD.	AGUA DULCE	ND	3.99	ND	1.70
12753 SIERRA HWY.	AGUA DULCE	ND	8.27	ND	0.73
13800 SIERRA HWY.	AGUA DULCE	1.05	5.30	14.60	ND
32222 AGUA DULCE CANYON RD.	AGUA DULCE	3.61	3.75	1.76	1.00
33301 - 33325 AGUA DULCE CANYON RD.	AGUA DULCE	ND	3.98	ND	1.19
33336 AGUA DULCE CANYON RD.	AGUA DULCE	ND	4.73	ND	1.79
33355 AGUA DULCE CANYON RD.	AGUA DULCE	ND	3.69	ND	0.97
33361 PEWTER RD. (WELL #1)	AGUA DULCE	6.91	ND	ND	ND
33361 PEWTER RD. (WELL #5)	AGUA DULCE	ND	ND	1.07	ND
34709 AGUA DULCE CANYON RD.	AGUA DULCE	ND	4.95	ND	ND
34736 AGUA DULCE CANYON RD.	AGUA DULCE	ND	6.24	ND	ND
7332 SIERRA HWY./ X-STREET PENMAN RD.	AGUA DULCE	ND	2.53	4.52	ND
9661 SIERRA HWY.	AGUA DULCE	7.84	2.74	ND	0.51
9830-9640 SIERRA HWY. (10124 SIERRA HWY)	AGUA DULCE	1.14	5.52	ND	1.40
2260 PINECREST DR. / MT. WILSON TOLL RD.	ALTADENA	1.73	2.94	ND	ND
MILLARD CANYON \ CHANEY TRAIL RD.	ALTADENA	4.91	ND	ND	ND
1/4 MILE S.E. OF ANGELES CREST HWY.	ANGELES NATIONAL	ND	ND	ND	ND
27 MILES-N OF LA CANADA, ROUTE 2	ANGELES NATIONAL	3.07	ND	ND	ND
ANGELES CREST / ANGELES FOREST HWY.	ANGELES NATIONAL	ND	ND	ND	ND
ANGELES CREST HWY.	ANGELES NATIONAL	1.43	ND	2.18	0.34
ANGELES CREST HWY. / CHARLTON	ANGELES NATIONAL	ND	ND	ND	ND
ANGELES CREST HWY. / STAR ROUTE	ANGELES NATIONAL	ND	ND	ND	ND
ANGELES CREST HWY. @ MT WILSON RD.	ANGELES NATIONAL	1.79	ND	ND	0.43
ANGELES CREST HWY.	ANGELES NATIONAL	ND	2.74	1.55	ND
AUDIO RD.	ANGELES NATIONAL	ND	ND	2.24	0.26
BIG SANTA ANITA CANYON	ANGELES NATIONAL	2.63	3.10	1.29	ND
HORSE FLAT RD.	ANGELES NATIONAL	ND	ND	2.63	ND
MT. WILSON RD.	ANGELES NATIONAL	ND	ND	2.00	ND
MT. WILSON RD.	ANGELES NATIONAL	ND	ND	3.12	ND
REDBOX-RINCON RD.	ANGELES NATIONAL	ND	3.38	2.75	ND
SAN GABRIEL CANYON RD.	ANGELES NATIONAL	5.27	ND	1.33	ND
SULPHER SPRINGS RD. / ANGELES CREST HWY.	ANGELES NATIONAL	ND	ND	ND	ND
SANTA ANITA CANYON RD.	ARCADIA	1.08	3.32	1.14	0.31
100 N. OLD SAN GABRIEL CANYON RD.	AZUSA	2.36	3.12	ND	ND
22550 E. FORK RD.	AZUSA	3.38	3.42	4.15	ND
23701 E. FORK RD.	AZUSA	2.77	ND	ND	ND
24210 E. FORK RD	AZUSA	1.74	3.35	ND	ND

Address	City	Arsenic	Total Chromium	Lead	Chromium+6
Detection Limit for Reporting		1 ppb	2.5 ppb	1 ppb	0.25 ppb
9700 SAN GABRIEL CANYON RD.	AZUSA	1.48	ND	ND	ND
WEST FORK, SAN GABRIEL CANYON RD.	AZUSA	ND	ND	2.26	ND
CRYSTAL LAKE \ SAN GABRIEL CANYON RD.	AZUSA	ND	2.64	ND	ND
JACKSON FLAT ACCESS RD. 3N26	BIG PINES	ND	ND	2.86	ND
19001 TONNER CANYON RD.	BREA	ND	ND	ND	ND
1301 N. LAS VIRGENES RD.	CALABASAS	3.07	ND	ND	ND
13130 SOLEDAD CANYON RD.	CANYON COUNTRY	ND	3.30	ND	ND
15564 SIERRA HWY.	CANYON COUNTRY	2.46	5.74	ND	0.96
16755 GAZELEY ST.	CANYON COUNTRY	2.57	7.10	1.20	0.65
17100 SIERRA HWY.	CANYON COUNTRY	1.84	2.81	6.25	ND
321 W. SEPULVEDA BLVD.	CARSON	ND	ND	ND	ND
38001 GOLDEN STATE HWY.	CASTAIC	1.16	3.56	37.00	ND
38200 N. LAKE HUGHES RD. (WELL #3)	CASTAIC	ND	ND	ND	ND
973 E. BADILLO, SUITE A	COVINA	ND	7.31	ND	ND
12915 JUNIPER ST. (WELL #1)	DOWNEY	2.21	ND	1.34	0.86
11922 E. LAMBERT AVE. (WELL #1)	EL MONTE	2.88	3.70	ND	0.53
11922 E. LAMBERT AVE. (WELL #2)	EL MONTE	2.28	3.22	ND	0.66
2257 BURKETT ST.	EL MONTE	1.43	2.70	ND	1.30
4730 N. COGSWELL	EL MONTE	2.57	3.21	ND	0.62
2600 DALTON CANYON RD.	GLENDORA	18.20	3.60	3.07	ND
46843 PEACE VALLEY RD.	GORMAN	3.62	3.92	1.81	0.58
43800 PYRAMID LAKE RD.	GORMAN	ND	ND	ND	ND
43800 PYRAMID LAKE RD.	GORMAN	2.46	3.79	ND	0.51
45100 COPCO AVE.	GORMAN	1.48	4.51	ND	ND
49744 GORMAN POST RD.	GORMAN	1.80	3.83	1.41	0.81
49847 GORMAN SCHOOL RD.	GORMAN	ND	3.48	ND	ND
38215 SAN FRANCISQUITO CANYON RD.	GREEN VALLEY	ND	3.56	ND	ND
13550 LIVE OAK	IRWINDALE	2.30	ND	1.09	0.44
15801 E. FIRST ST. (WELL #2)	IRWINDALE	3.50	ND	ND	ND
2 STAR ROUTE	LA CANADA	ND	ND	1.24	ND
STAR ROUTE- MILE MARKER 53	LA CANADA	2.45	ND	7.07	0.33
3331 SAN DIMAS CANYON RD.	LA VERNE	6.12	8.79	13.80	ND
6601 / 6634 N. STEPHENS RANCH RD.	LA VERNE	ND	ND	ND	ND
24303 PINE CANYON	LAKE HUGHES	ND	ND	ND	0.48
16633 ELIZABETH LAKE RD.	LAKE HUGHES	ND	6.10	5.87	ND
17000 ELIZABETH LAKE RD.	LAKE HUGHES	ND	4.93	ND	ND
18651 PINE CANYON RD.	LAKE HUGHES	ND	3.62	ND	ND
18651 PINE CANYON RD. (NURSERY WELL)	LAKE HUGHES	ND	ND	1.17	0.28
24100 PINE CANYON RD.	LAKE HUGHES	ND	ND	ND	ND
41600 LAKE HUGHES RD.	LAKE HUGHES	ND	4.71	ND	ND
42220 / 42230 LAKE HUGHES RD.	LAKE HUGHES	ND	4.84	2.13	ND
26486 PINE CANYON RD.	LAKE HUGHES	ND	4.41	ND	0.33
8955 W. GOLD CREEK RD.	LAKE VIEW TERRACE	1.54	4.15	1.40	ND
43322 147TH ST. E	LANCASTER	2.12	6.04	ND	4.30
1304 EAST AVE I	LANCASTER	ND	11.60	ND	11.40
1617 EAST AVE I	LANCASTER	1.80	11.00	ND	11.00
1725 WEST AVE K-8	LANCASTER	1.47	9.97	ND	9.71
2059 EAST AVE I	LANCASTER	1.43	11.20	ND	9.30
231 WEST AVE G	LANCASTER	42.40	ND	ND	ND
2515 EAST AVE I	LANCASTER	1.91	9.29	1.84	9.10
2550 EAST AVE I	LANCASTER	ND	10.20	ND	9.40

Address	City	Arsenic	Total Chromium	Lead	Chromium+6
Detection Limit for Reporting		1 ppb	2.5 ppb	1 ppb	0.25 ppb
28115 WEST AVE C-6	LANCASTER	13.60	3.74	ND	1.21
3157 EAST AVE I	LANCASTER	ND	10.70	ND	9.50
3657 EAST AVE K-12	LANCASTER	1.33	6.12	ND	4.57
3753 EAST AVE I	LANCASTER	1.02	8.47	ND	8.42
42843 172ND ST. EAST	LANCASTER	3.48	8.14	2.62	5.70
43841 N. 90TH ST. EAST	LANCASTER	ND	4.83	ND	3.00
44100 20TH ST. EAST	LANCASTER	1.72	8.20	ND	6.90
44522 N. 85TH ST. EAST (44609 86TH ST.)	LANCASTER	ND	5.12	ND	2.50
44717 18TH ST. WEST	LANCASTER	1.16	11.50	ND	10.90
44900 60TH ST. WEST	LANCASTER	3.33	5.83	ND	3.58
46124 125TH ST. EAST (12501 E. AVE H)	LANCASTER	2.70	13.40	4.90	12.30
46201 KINGS CANYON RD.	LANCASTER	ND	3.18	ND	ND
47205 60TH ST. EAST	LANCASTER	1.16	5.89	ND	6.35
47455 N. DIVISION ST.	LANCASTER	18.20	4.37	ND	1.80
47650 N. 50TH ST. EAST	LANCASTER	ND	6.81	ND	7.49
507 EAST AVE L-8	LANCASTER	3.78	10.80	ND	10.00
5159 EAST AVE K-8	LANCASTER	ND	4.57	ND	3.30
5300 WEST AVE I	LANCASTER	10.10	3.82	2.15	2.05
600 EAST AVE F	LANCASTER	5.61	9.76	5.63	1.12
6742 EAST AVE H	LANCASTER	1.08	7.09	ND	6.32
721 WEST AVE E	LANCASTER	21.20	2.56	1.41	1.21
9133 EAST AVE J	LANCASTER	ND	5.81	ND	4.00
42810 FRAZIER MOUNTAIN RD.	LEBEC	ND	3.77	ND	0.30
CHESEBORO RD.	LITTLEROCK	ND	ND	3.90	ND
31110 LARGO VISTA RD. (28600 LARGO VISTA RD	LLANO	ND	6.54	1.52	0.50
32810 165TH ST. EAST (WELL #5)	LLANO	ND	2.80	ND	ND
32810 165TH ST. EAST (WELL #3)	LLANO	ND	2.87	ND	ND
1250 ENCINAL CANYON RD.	MALIBU	ND	ND	ND	ND
3133 S DECKER CANYON RD.	MALIBU	ND	6.70	6.30	ND
34342 MULHOLLAND HWY.	MALIBU	ND	ND	1.75	ND
34342 MULHOLLAND HWY.	MALIBU	ND	3.31	ND	ND
35375 MULHOLLAND HWY.	MALIBU	1.38	6.04	3.40	ND
433 / 427 S. ENCINAL CANYON RD.	MALIBU	2.42	ND	ND	ND
1300 N. CANYON BLVD.	MONROVIA	1.18	2.85	1.30	0.77
1100 N. CANYON BLVD	MONROVIA	ND	ND	ND	ND
23500 THE OLD ROAD	NEWHALL	1.33	3.99	ND	1.39
3000 RUSTIC CANYON RD.	PACIFIC PALISADES	ND	4.34	ND	ND
8710 W. SIERRA HWY.	PALMDALE	ND	ND	4.65	ND
36431 41ST ST. E. (500 FT. NORTH)	PALMDALE	ND	2.71	ND	1.50
20TH STREET West / AVE O - 2	PALMDALE	1.09	16.60	4.08	ND
32700 CHESEBORO	PALMDALE	1.79	ND	1.64	ND
34220 CHESEBORO RD., SPACE 16	PALMDALE	ND	ND	ND	ND
3620 EAST AVE P	PALMDALE	ND	6.80	4.52	5.50
36223 N. SIERRA HWY.	PALMDALE	3.68	5.22	ND	1.20
38015 65TH ST. EAST	PALMDALE	ND	5.27	4.00	2.50
40317 N. 11TH ST. WEST	PALMDALE	1.06	6.10	ND	2.50
40832 40TH ST. WEST	PALMDALE	ND	3.46	ND	2.20
6150 EAST AVENUE T.	PALMDALE	ND	ND	ND	0.48
ANGELES FOREST HWY./ PALMDALE	PALMDALE	ND	2.71	3.42	ND
28000 DEVILS PUNCH BOWL RD.	PEARBLOSSOM	ND	ND	ND	ND
9238-46 LOWER AZUSA RD.	ROSEMEAD	ND	7.36	ND	6.20

Address	City	Arsenic	Total Chromium	Lead	Chromium+6
Detection Limit for Reporting		1 ppb	2.5 ppb	1 ppb	0.25 ppb
1900 SYCAMORE CANYON RD.	SAN DIMAS	ND	ND	ND	ND
10317 LOPEZ CANYON RD.	SAN FERNANDO	1.78	4.20	1.08	0.52
12087 LOPEZ CANYON RD.	SAN FERNANDO	ND	ND	ND	ND
12249 LOPEZ CANYON RD.	SAN FERNANDO	1.73	ND	5.35	ND
12651 LITTLE TUJUNGA CANYON RD.	SAN FERNANDO	3.16	5.46	3.61	ND
12653 N. BOUQUET CANYON RD.	SAN FERNANDO	1.52	ND	1.67	ND
28440 SAN FRANCISQUITO CANYON RD.	SANTA CLARITA	ND	ND	ND	ND
21501 SAND CANYON RD.	SANTA CLARITA	1.87	ND	1.82	ND
21521 N. SAND CANYON RD.	SANTA CLARITA	1.73	ND	ND	ND
10645 SOLEDAD CANYON RD.	SAUGUS	1.00	3.25	ND	ND
12117 SIERRA HWY.	SAUGUS	ND	ND	1.78	ND
12635 SIERRA HWY.	SAUGUS	1.49	ND	1.32	0.59
13061 CHRISCO ST. (WELL #1)	SAUGUS	ND	2.61	ND	0.79
28700 / 28750 BOUQUET CANYON RD.	SAUGUS	2.24	3.41	3.36	0.32
28877 BOUQUET CANYON RD.	SAUGUS	13.30	ND	ND	ND
29021 BOUQUET CANYON RD.	SAUGUS	2.09	5.54	4.28	ND
29890 BOUQUET CANYON RD. (WELL #5)	SAUGUS	ND	2.53	ND	ND
29908 BOUQUET CANYON RD.	SAUGUS	1.33	2.77	ND	ND
30061 SAN FRANCISQUITO CANYON RD. (WELL #	SAUGUS	19.10	5.55	ND	ND
30061 SAN FRANCISQUITO CANYON RD. (WELL #	SAUGUS	72.00	4.72	ND	ND
30769 SAN FRANCISQUITO CANYON RD.	SAUGUS	64.50	4.06	1.38	ND
30800 BOUQUET CANYON RD.	SAUGUS	1.06	ND	6.51	ND
33101 BOUQUET CANYON RD.	SAUGUS	1.08	7.11	ND	ND
33255 CASA DULCE LN.	SAUGUS	3.91	ND	2.08	ND
35100 SAN FRANCISQUITO CANYON RD.	SAUGUS	ND	3.82	ND	ND
9777 SOLELAD CANYON RD.	SAUGUS	ND	2.59	1.63	ND
555 N. DURFEE AVE. (SAME AS ABOVE?)	SOUTH EL MONTE	1.63	5.95	ND	0.56
15300 PACOIMA CANYON RD.	SYLMER	ND	3.01	2.86	ND
12500 BIG TUJUNGA CANYON RD.	TUJUNGA	1.91	ND	ND	ND
3150 BIG TUJUNGA CANYON RD.	TUJUNGA	22.80	ND	ND	ND
3275 STONEYVALE RD.	TUJUNGA	3.63	4.92	ND	ND
803 BIG TUJUNGA CANYON RD.	TUJUNGA	ND	3.52	9.86	ND
STONEYVALE RD.	TUJUNGA	ND	4.35	ND	ND
22601 BIG PINES HWY. (ROAD SIDE VALVE)	VALYERMO	ND	5.34	2.95	ND
14600 PALLET CREEK RD.	VALYERMO	ND	2.86	ND	ND
18101 PARADISE DR.	VALYERMO	ND	3.96	ND	ND
20033 BIG PINE HWY. (WELL #1)	VALYERMO	ND	3.45	ND	ND
29835 VALYERMO RD.	VALYERMO	ND	3.52	1.36	ND
33306 AGUA DULCE CANYON RD.	VASQUEZ ROCKS	ND	4.12	ND	2.30
21280 BIG PINES HWY.	WRIGHTWOOD	ND	8.28	3.91	ND
24510 STATE HWY. 2 (WELL #5)	WRIGHTWOOD	ND	5.31	ND	ND
24510 STATE HWY. 2 (WELL #1)	WRIGHTWOOD	ND	8.87	ND	0.61
24510 STATE HWY. 2 (WELL #3)	WRIGHTWOOD	ND	6.66	ND	0.49
25234 BIG PINES HWY.	WRIGHTWOOD	ND	2.97	4.11	ND
50 FT. SOUTHEAST OF JACKSON LAKE	WRIGHTWOOD	1.00	4.92	7.75	ND
BIG PINES HWY (300 FT. NORTH OF CAMP, ACRO	WRIGHTWOOD	ND	5.82	1.04	0.50